

# TETANUS.<sup>1</sup>

A STUDY OF THE NATURE, EXCITANT, LESIONS, SYMPTOMATOLOGY, AND TREATMENT OF THE DISEASE, WITH A CRITICAL SUMMARY OF THE RESULTS OF SERUM THERAPY.

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No. 98.—*Name*, Blumenthal.<sup>167</sup> *Year*, 1896. *Diagnosis*, Tetanus puerperalis. *Period of incubation*, seven days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 30.0. *Make*, Boer. *Other treatment*, chloral. *Result*, death.

No. 99.—*Name*, Austin.<sup>168</sup> *Year*, 1896. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, possibly caused by various scratches on arm. *Period of incubation*, about five days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 20 cubic centimetres. *Make*, New York Board of Health. *Other treatment*, KBr, chloral. *Result*, recovery. *Remarks*. Author says that three hours after injection, the patient could open his mouth better; one and a half hours later still better, and was entirely cured next morning.

Of the symptoms mentioned, we find severe pains in the masseter muscle and teeth, which were firmly pressed together. Pain radiating from the condyles of the jaw along the bone to the second molar tooth, and from behind the ear to the clavicle; sore throat on swallowing.

(Judging from above description and from the rapid recovery (three hours), it appears more like a case of spurious lockjaw, possibly caused by some infection of the tonsil, or by a carious tooth (second molar)).

No. 100.—*Name*, Whittington.<sup>169</sup> *Year*, 1896. *Diagnosis*, Tetanus puerperalis. *Nature of injury*, Abortion. *Period of incubation*, about

<sup>1</sup> Read at the meeting of the New York County Medical Society, April 23, 1900.

thirteen days. *Day of first injection*, twelfth day. *Method of administration*, subcutaneous. *Amount*, 90 cubic centimetres. *Make*, New York Institute Pasteur. *Other treatment*, KBr, chloral. *Result*, recovery. *Remarks*. Author argues distinctly for the correctness of the diagnosis as opposed to hysteria, in view of following facts:

(1) The initial prominence of the trismus and its persistence in the intervals of general spasms. (Does not necessarily and exclusively speak for tetanus.)

(2) The absence of all sensory disturbances and of other stigmata of hysteria. (Does not necessarily exclude hysteria.)

(3) The fair preservation of consciousness. (May occur also in hysteria.)

(4) The character of the temperature chart. (We have no characteristic temperature chart for tetanus.)

(5) The etiological relation. (Not every case of abortion is followed by tetanus.)

(Description of case sounds very much like hysteria.)

No. 101.—*Name*, Engelmann.<sup>110</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of nose. *Period of incubation*, seven days. *Day of first injection*, seventeenth day. *Method of administration*, subcutaneous. *Amount*, 9.0. *Make*, Tizzoni. *Other treatment*, morphine, KBr, chloral. *Result*, recovery. *Remarks*. Author says that, judging from period of incubation, the case was bad; but from the progress, the case had a fair prognosis.

No. 102.—*Name*, Engelmann.<sup>110</sup> *Year*, 1897. *Diagnosis*, Tetanus(?). *Nature of injury*, no discoverable cause. *Period of incubation*, unknown. *Day of first injection*, thirteenth day. *Method of administration*, subcutaneous. *Amount*, 9.0. *Make*, Tizzoni. *Other treatment*, morphine, chloral, KBr. *Result*, recovery. *Remarks*. Judging from the symptoms, a bad case.

No. 103.—*Name*, Engelmann.<sup>110</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of thumb. *Period of incubation*, nine days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 20 cubic centimetres. *Make*, Behring. *Other treatment*, morphine. *Result*, recovery. *Remarks*. Tetanus bacilli found on the splinter. Author counts this case to the medium grave form. He will not say with certainty that recovery was due to the antitoxin, but it cannot be denied that there were good effects.

No. 104.—*Name*, Teichmann.<sup>111</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, punctured wound of foot. *Period of incubation*, seven days. *Day of first injection*, seventh day. *Method of administration*, subcutaneous. *Amount*, 5 cubic centimetres. *Make*, not stated. *Other treatment*, chloral. *Result*, recovery.

No. 105.—*Name*, Kortmann.<sup>112</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound over knee. *Period of incubation*, seven days. *Day of first injection*, first day. *Method of administration*, intravenous. *Amount*, 5 cubic centimetres. *Make*, not stated. *Other treatment*, chloral. *Result*, death. *Remarks*. Death followed very

rapidly, only twenty-seven hours after onset; injection five hours after making diagnosis.

No. 106.—*Name*, Jacob.<sup>173</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, pistol-shot wound of shoulder. *Period of incubation*, twelve days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 10.0. *Make*, Behring. *Other treatment*, chloral. *Result*, recovery.

No. 107.—*Name*, Höfling.<sup>174</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of little finger. *Period of incubation*, approximately nine days. *Day of first injection*, eighth day. *Method of administration*, subcutaneous. *Amount*, 10.0. *Make*, Behring. *Other treatment*, none. *Result*, recovery. *Remarks*. Little finger was amputated, but no internal medication was given.

No. 108.—*Name*, Merkel.<sup>175</sup> *Year*, 1897. *Diagnosis*, Tetanus puerperalis. *Nature of injury*, introduction of bougie into uterus to induce abortion. *Period of incubation*, not stated. *Day of first injection*, not stated. *Method of administration*, not stated. *Amount*, not stated. *Make*, not stated. *Other treatment*, not stated. *Result*, death.

No. 109.—*Name*, Merkel.<sup>175</sup> *Year*, 1897. *Diagnosis*, Tetanus puerperalis. *Nature of injury*, introduction of bougie into uterus to induce abortion. *Period of incubation*, not stated. *Day of first injection*, not stated. *Method of administration*, not stated. *Amount*, not stated. *Make*, not stated. *Other treatment*, not stated. *Result*, death.

No. 110.—*Name*, Hollis.<sup>176</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of scalp. *Period of incubation*, seven days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 160 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, not stated. *Result*, recovery.

No. 111.—*Name*, Beamish.<sup>177</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of leg, followed by gangrene. *Period of incubation*, twelve days. *Day of first injection*, seventh day. *Method of administration*, subcutaneous. *Amount*, 10 cubic centimetres. *Make*, not stated. *Other treatment*, not stated. *Result*, recovery. *Remarks*. Amputation of leg. Though only ten cubic centimetres were injected and somewhat late in the disease, it was still followed by recovery. (Somewhat unusual.)

No. 112.—*Name*, McWatt.<sup>178</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of thumb. *Period of incubation*, one week. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 60 grains. *Make*, Tizzoni. *Other treatment*, chloral. *Result*, recovery. *Remarks*. Author says, a case with a very bad prognosis, and thinks recovery was due entirely to the antitoxin.

No. 113.—*Name*, Proudfoot.<sup>179</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, numerous wounds on hand. *Period of incubation*, uncertain. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount* 3.0 and 20 cubic centimetres. *Make*, not stated. *Other treatment*, chloral, oxygen, anæsthesia. *Result*, death. *Re-*

marks. Author says that he saw no benefit from the antitoxin, but also that possibly he used too little.

No. 114.—Name, Carter.<sup>150</sup> Year, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, wound of hand. *Period of incubation*, not stated. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 20 cubic centimetres. *Make*, British Institute of Preventive Medicine. *Other treatment*, chloral. *Result*, recovery. *Remarks*. Insufficient report in both cases.

No. 115.—Name, Carter.<sup>150</sup> Year, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury to finger. *Period of incubation*, not stated. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 54 cubic centimetres. *Make*, French. *Other treatment*, chloral, gelsemium. *Result*, death.

No. 116.—Name, Blake.<sup>151</sup> Year, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound, with opening into knee-joint. *Period of incubation*, eleven days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 99 cubic centimetres. *Make*, British Institute of Preventive Medicine. *Other treatment*, chloral, KBr. *Result*, death.

No. 117. Name, Smart.<sup>152</sup> Year, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, crushed wound of finger. *Period of incubation*, nine days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 50 cubic centimetres. *Make*, not stated. *Other treatment*, chloral, KBr. *Result*, recovery. *Remarks*. Author thinks that, though sedatives were used continuously, the symptoms were much alleviated by the antitoxin.

No. 118.—Name, Smythe.<sup>153</sup> Year, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, ulcer of leg. *Period of incubation*, unknown. *Day of first injection*, fourth day. *Method of administration*, subcutaneous. *Amount*, 110 cubic centimetres. *Make*, British Institute of Preventive Medicine and Paris Institute Pasteur. *Other treatment*, chloral, KBr. *Result*, recovery. *Remarks*. Author does not want to say how much of the improvement was due to the antitoxin, but thinks that amelioration of the symptoms followed each injection.

No. 119.—Name, Turner.<sup>154</sup> Year, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, punctured wound of foot, caused by a rusty nail. *Period of incubation*, fourteen days. *Day of first injection*, seventh day. *Method of administration*, subcutaneous. *Amount*, 70 grains. *Make*, Tizzoni. *Other treatment*, chloral, KBr. *Result*, recovery. *Remarks*. Author says that, taking everything into consideration, this was a rather mild case, with a long period of incubation, and it appeared to him that the chloral had more effect than the antitoxin in controlling the spasms.

No. 120.—Name, Chapman.<sup>155</sup> Year, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of forearm. *Period of incubation*, eighteen days. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 360 grains. *Make*, not stated. *Other treatment*, not stated. *Result*, recovery. *Remarks*. Author says that the

part played by the antitoxin in the successful issue of the case is somewhat doubtful, as the prognosis was favorable from the first.

No. 121.—*Name*, Chalmers.<sup>100</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, complete crushing of terminal phalanx of finger. *Period of incubation*, six days. *Day of first injection*, eighth day. *Method of administration*, subcutaneous. *Amount*, 15 grains, 53 grains. *Make*, Roux and Tizzoni respectively. *Other treatment*, chloral, KBr. *Result*, recovery. *Remarks*. Author thinks that improvement was particularly due to Tizzoni's antitoxin; not much effect from Roux's preparation.

No. 122.—*Name*, Blaker.<sup>101</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, punctured wound of palm caused by a piece of glass. *Period of incubation*, twelve days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, not stated. *Make*, not stated. *Other treatment*, chloral, opium, HgI<sub>2</sub> baths. *Result*, recovery. *Remarks*. Author places considerable importance upon the HgI<sub>2</sub> baths. (Why?)

No. 123.—*Name*, Marsack.<sup>102</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, punctured wound of foot caused by a piece of glass. *Period of incubation*, eleven days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 6.0. *Make*, British Institute of Preventive Medicine. *Other treatment*, chloral, morphine. *Result*, recovery.

No. 124.—*Name*, Marsack.<sup>103</sup> *Year*, 1897. *Diagnosis*, T. (?). *Nature of injury*, cause not discovered. *Period of incubation*, unknown. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 3.0. *Make*, British Institute of Preventive Medicine. *Other treatment*, chloral, KBr. *Result*, recovery. *Remarks*. Author thinks that both were severe cases; he saw no improvement after the antitoxin, but believes it has some value, particularly if combined with chloral and KBr.

No. 125.—*Name*, Goldsmith.<sup>104</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, abrasion on dorsum of hand. *Period of incubation*, thirteen days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 50 cubic centimetres, 90 grains. *Make*, Burroughs, Welcome & Co. and British Institute of Preventive Medicine respectively. *Other treatment*, chloral, KBr, morphine. *Result*, recovery. *Remarks*. Author will not say what share the antitoxin had in the recovery. Judging from the symptoms, it was a bad case.

No. 126.—*Name*, McCausland.<sup>105</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, abrasions on legs. *Period of incubation*, one day. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 10 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, not stated. *Result*, recovery. *Remarks*. A poorly reported case; and, although author argues for it, the diagnosis is not by any means proven. The onset was too rapid, and also the recovery; patient being better in one day.

No. 127.—*Name*, Plücker.<sup>106</sup> *Year*, 1897. *Diagnosis*, Tetanus cephalicus. *Nature of injury*, injury of eye by kick of a horse, with fracture

of orbit and injury of brain. *Period of incubation*, eleven days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, not stated. *Make*, Tizzoni. *Other treatment*, not stated. *Result*, death. *Remarks*. Autopsy revealed nothing of importance; not even meningitis.

No. 128.—*Name*, Trapp.<sup>192</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of scalp. *Period of incubation*, five days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 6.75. *Make*, Tizzoni. *Other treatment*, KBr. *Result*, recovery. *Remarks*. Author considers it a very bad case, but judging from the description of the symptoms, not from the period of incubation, it does not appear to be a very bad case. Author thinks recovery was due to the antitoxin.

No. 129. *Name*, Suter.<sup>193</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, crushed injury of toe. *Period of incubation*, eleven days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 5.0, 15 cubic centimetres. *Make*, Behring, Bern make. *Other treatment*, chloral, opium, morphine. *Result*, recovery. *Remarks*. Author considers it a mild case from the beginning.

No. 130.—*Name*, Suter.<sup>193</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of thumb. *Period of incubation*, about four weeks. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 15.0. *Make*, Behring. *Other treatment*, chloral, morphine, KBr. *Result*, death. *Remarks*. Author says a very bad case in spite of unusually long period of incubation. When the patient died, the wound was totally healed, but at autopsy Tetanus bacilli were found in the cicatrix (very interesting, almost unique).

No. 131.—*Name*, Suter.<sup>193</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, crushed injury of hand. *Period of incubation*, eight days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 2 bottles. *Make*, Bernese serum antitetanique. *Other treatment*, chloral and morphine, venesection. *Result*, death. *Remarks*. Also a very bad case, particularly if symptoms and progress are taken into consideration.

No. 132.—*Name*, Wendling.<sup>194</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of bridge of nose. *Period of incubation*, not stated. *Day of first injection*, about tenth day. *Method of administration*, subcutaneous. *Amount*, not stated. *Make*, Behring. *Other treatment*, morphine, chloral, etc. *Result*, recovery. *Remarks*. Author says that, although this case was of the more chronic form, it was still very desolate and bad; and says undoubtedly it was the antitoxin which saved this patient from untimely death.

No. 133.—*Name*, Rudis-Jicinsky.<sup>195</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of thigh caused by a boar's bite. *Period of incubation*, five and one-half hours. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, about 200 cubic centimetres. *Make*, not stated. *Other treatment*, morphine, KBr, anaesthesia. *Result*, recovery. *Remarks*. An exceedingly short period of incubation.

No. 134.—*Name*, Asam.<sup>191</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of foot. *Period of incubation*, about three weeks. *Day of first injection*, second day. *Method of administration*, intravenous. *Amount*, 5.0. *Make*, Behring. *Other treatment*, chloral and morphine. *Result*, recovery. *Remarks*. Author thinks recovery was due to the antitoxin, and urges its continued trial.

No. 135.—*Name*, Weischer.<sup>192</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of finger. *Period of incubation*, four days. *Day of first injection*, sixth day. *Method of administration*, subcutaneous. *Amount*, 10.0. *Make*, Behring. *Other treatment*, not stated. *Result*, recovery. *Remarks*. Author says recovery was undoubtedly due to the antitoxin.

No. 136.—*Name*, Coffin.<sup>193</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of hand caused by a piece of bone. *Period of incubation*, four days. *Day of first injection*, sixth day. *Method of administration*, subcutaneous. *Amount*, 1800 cubic centimetres. *Make*, Parke, Davis & Co. *Other treatment*, chloral, NaBr, morphine. *Result*, recovery. *Remarks*. Author and others who have seen the case agree that patient could not have recovered without the use of the antitoxin. (Large quantity used.)

No. 137.—*Name*, Foster.<sup>194</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of foot caused by a nail. *Period of incubation*, one week. *Day of first injection*, sixth day. *Method of administration*, subcutaneous. *Amount*, 80 cubic centimetres. *Make*, Parke, Davis & Co. *Other treatment*, chloral, KBr, morphine, cannabis, hyoscyamus. *Result*, recovery.

No. 138.—*Name*, Fauser.<sup>200</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of finger. *Period of incubation*, not given in reference. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 80 cubic centimetres. *Make*, Preisz. *Other treatment*, not stated. *Result*, recovery. *Remarks*. Original (Orvosi Hetilap) not obtainable.

No. 139.—*Name*, Réczey.<sup>201</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, wound of hand caused by bite of monkey, and later infected by dissecting a horse dead of tetanus. *Period of incubation*, two days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, not stated. *Make*, not stated. *Other treatment*, chloral, pilocarpine. *Result*, recovery. *Remarks*. Author thinks that the short period of incubation and the remarkable rapidity were due to the absorption of already existing tetanus toxins from the tetanic horse. (Good recovery!! from a bad case.)

No. 140.—*Name*, Rubeska.<sup>202</sup> *Year*, 1897. *Diagnosis*, Tetanus puerperalis. *Nature of injury*, induced abortion for placenta prævia. *Period of incubation*, about nine days. *Day of first injection*, fourth day. *Method of administration*, subcutaneous. *Amount*, 0.2 every five hours. *Make*, Tizzoni. *Other treatment*, not stated. *Result*, death. *Remarks*. Death followed nine days after onset of symptoms.

No. 141.—*Name*, Rubeska.<sup>202</sup> *Year*, 1897. *Diagnosis*, Tetanus puerperalis. *Nature of injury*, normal delivery. *Period of incubation*, nine-

teen days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, not stated. *Make*, Tizzoni. *Other treatment*, not stated. *Result*, death.

No. 142.—*Name*, Steiner.<sup>203</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, incised wound of thumb. *Period of incubation*, eleven days. *Day of first injection*, seventh day. *Method of administration*, subcutaneous. *Amount*, 4.5. *Make*, Tizzoni. *Other treatment*, chloral, morphine, sulphonal. *Result*, recovery.

No. 143.—*Name*, Bargelessi.<sup>201</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury to hand. *Period of incubation*, nine days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 5.0. *Make*, Tizzoni. *Other treatment*, not stated. *Result*, recovery.

No. 144.—*Name*, Bargelessi.<sup>201</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury to foot. *Period of incubation*, nine days. *Day of first injection*, fourth day. *Method of administration*, subcutaneous. *Amount*, 6.0. *Make*, Tizzoni. *Other treatment*, chloral and morphine. *Result*, recovery. *Remarks*. Very bad case, followed by recovery.

No. 145.—*Name*, Frassi.<sup>203</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, extensive injury of leg. *Period of incubation*, fifteen days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 3.9. *Make*, Tizzoni. *Other treatment*, chloral and KBr. *Result*, recovery. *Remarks*. Very bad case in spite of long period of incubation.

No. 146.—*Name*, Archmard.<sup>200</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, punctured wound of foot caused by a nail. *Period of incubation*, five days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 20 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral, bromide. *Result*, recovery.

No. 147.—*Name*, Archmard.<sup>200</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of foot. *Period of incubation*, about four weeks. *Day of first injection*, fifth day. *Method of administration*, subcutaneous. *Amount*, 20 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral, bromide. *Result*, recovery.

No. 148.—*Name*, Archmard.<sup>200</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of foot. *Period of incubation*, four to five days. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 3 injections. *Make*, Parke, Davis & Co. *Other treatment*, chloral, bromide. *Result*, recovery.

No. 149.—*Name*, Archmard.<sup>200</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, traumatic ulcer of foot. *Period of incubation*, about two weeks. *Day of first injection*, sixth day. *Method of administration*, subcutaneous. *Amount*, 40 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral, bromide. *Result*, recovery.

No. 150.—*Name*, Archmard.<sup>200</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, wound of lip and face. *Period of incubation*, five days. *Day of first injection*, second day. *Method of administration*,



subcutaneous. *Amount*, 60 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral, bromide. *Result*, recovery.

No. 151.—*Name*, Archmard.<sup>208</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, incised wound of thigh. *Period of incubation*, eleven days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 40 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral, bromide. *Result*, death.

No. 152.—*Name*, Archmard.<sup>209</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of foot. *Period of incubation*, eleven days. *Day of first injection*, fourth day. *Method of administration*, subcutaneous. *Amount*, 40 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral, bromide, physostigmine. *Result*, death.

No. 153.—*Name*, Archmard.<sup>209</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of hand. *Period of incubation*, fourteen days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 62 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, none purposely. *Result*, recovery.

No. 154.—*Name*, Archmard.<sup>209</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of thumb. *Period of incubation*, less than twelve days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 40 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral, bromide. *Result*, recovery.

No. 155.—*Name*, Rose.<sup>207</sup> *Year*, 1897. *Diagnosis*, Tetanus(?). *Nature of injury*, cause not discovered. *Period of incubation*, unknown. *Day of first injection*, fourth day. *Method of administration*, intravenous. *Amount*, 5.0. *Make*, Behring. *Other treatment*, opium, chloral. *Result*, recovery. *Remarks*, mild case.

No. 156.—*Name*, Rose.<sup>207</sup> *Year*, 1897. *Diagnosis*, Tetanus neonatorum. *Nature of injury*, infection of umbilicus. *Period of incubation*, six days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 5.0. *Make*, Behring. *Other treatment*, not stated. *Result*, death.

No. 157.—*Name*, Boinet.<sup>203</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, numerous scratches on skin; possibly also through respiratory tract. *Period of incubation*, unknown. *Day of first injection*, eighth day. *Method of administration*, subcutaneous. *Amount*, 100 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, not stated. *Result*, recovery.

No. 158.—*Name*, Lardy.<sup>202</sup> *Year*, 1896. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of foot, caused by nail. *Period of incubation*, fifteen days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 40 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral. *Result*, recovery.

No. 159.—*Name*, Steer.<sup>210</sup> *Year*, 1896. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, punctured wound of foot, caused by a shoe-nail. *Period of incubation*, about two weeks. *Day of first injection*, fifth day. *Method of administration*, subcutaneous. *Amount*, about 130 cubic centimetres. *Make*, British Institute of Preventive Medicine. *Other treatment*, chloral and bromide. *Result*, recovery.

No. 160.—*Name*, Grayson.<sup>211</sup> *Year*, 1896. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, punctured wound of foot, caused by a wire. *Period of incubation*, seven to eight days. *Day of first injection*, twelfth day. *Method of administration*, subcutaneous. *Amount*, 25 cubic centimetres. *Make*, not stated. *Other treatment*, chloral, bromide. *Result*, recovery. *Remarks*. Apparently a mild case in spite of short period of incubation.

No. 161.—*Name*, Gouley.<sup>212</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, shot wound of finger. *Period of incubation*, not stated. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, not stated. *Make*, not stated. *Other treatment*, not stated. *Result*, death.

No. 162.—*Name*, Cavandoli.<sup>213</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of foot. *Period of incubation*, ten days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 13.5. *Make*, Tizzoni. *Other treatment*, chloral. *Result*, recovery.

No. 163.—*Name*, Rabek.<sup>214</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of great toe. *Period of incubation*, seven days. *Day of first injection*, seventh day. *Method of administration*, subcutaneous. *Amount*, 50 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, purposely none. *Result*, recovery.

No. 164.—*Name*, Owens and Porter.<sup>215</sup> *Year*, 1897. *Diagnosis*, Tetanus cephalicus. *Nature of injury*, extensive laceration of face and scalp. *Period of incubation*, seven days. *Day of first injection*, sixth day. *Method of administration*, subcutaneous. *Amount*, 90 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral, NaBr, physostigmine. *Result*, death. *Remarks*. Author says that the antitoxin injections apparently exerted no influence upon the tetanic symptoms.

No. 165.—*Name*, Owens and Porter.<sup>215</sup> *Year*, 1897. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, compound fracture of index. *Period of incubation*, eight days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 30 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral, bromide. *Result*, death.

No. 166.—*Name*, Tauber.<sup>216</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, wound of great toe. *Period of incubation*, not stated. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 10.0. *Make*, Behring. *Other treatment*, chloral. *Result*, death.

No. 167.—*Name*, Reinhard.<sup>217</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of hand, with subsequent amputation. *Period of incubation*, twenty-four(?) days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 120 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral. *Result*, recovery. *Remarks*. Quite a long period of incubation; etiology is also uncertain, caused either by the original injury or by the operation. Author says that improvement always set in five or six hours after each injection.

No. 168.—*Name*, Möller.<sup>218</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, tearing off of hand and part of forearm. *Period of incubation*, thirteen days. *Day of first injection*, seventh day. *Method of administration*, subcutaneous. *Amount*, 4.5. *Make*, Tizzoni. *Other treatment*, morphine. *Result*, recovery. *Remarks*. Author says that improvement was always noted five or six hours after each injection.

No. 169.—*Name*, Erdheim.<sup>219</sup> *Year*, 1898. *Diagnosis*, Tetanus cephalicus. *Nature of injury*, small ulcer on cheek. *Period of incubation*, thirteen days. *Day of first injection*, second day. *Method of administration*, intravenous, subcutaneous. *Amount*, 5.0. *Make*, Behring. *Other treatment*, chloral, morphine. *Result*, death. *Remarks*. Author says that prognostically the first case was better than the second.

No. 170.—*Name*, Erdheim.<sup>219</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, incised wound of heel. *Period of incubation*, five days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 10.0. *Make*, Behring. *Other treatment*, not stated. *Result*, death.

No. 171.—*Name*, Krokiewitz.<sup>220</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Period of incubation*, seven days. *Day of first injection*, eighth day. *Method of administration*, subcutaneous. *Amount*, 195.0. *Make*, not stated. *Other treatment*, chloral, KI, hyoseyamine, morphine. *Result*, recovery. *Remarks*. Author is more in favor of the injection of a calf's brain emulsion, believing, with Ehrlich and Wassermann and Takaki, that the brain has a certain tetanus antitoxic power.

No. 172.—*Name*, Bruno.<sup>221</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of finger. *Period of incubation*, four days. *Day of first injection*, third day. *Method of administration*, subcutaneous, intravenous. *Amount*, 500 units, 25 units. *Make*, Behring. *Other treatment*, morphine. *Result*, death. *Remarks*. In the summary of his three cases, author says he saw no improvement in either case. On the contrary, all the patients became worse after the injection; although in the second and third case the injections were given very early in the disease.

No. 173.—*Name*, Bruno.<sup>221</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, not stated. *Period of incubation*, nine days. *Day of first injection*, second day. *Method of administration*, intravenous. *Amount*, 500 units. *Make*, Behring. *Other treatment*, morphine, chloral. *Result*, death.

No. 174.—*Name*, Bruno.<sup>221</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, not stated. *Period of incubation*, seven days. *Day of first injection*, first day. *Method of administration*, intravenous. *Amount*, 500 units. *Make*, Behring. *Other treatment*, not stated. *Result*, death.

No. 175.—*Name*, Schubert.<sup>222</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, compound fracture of second phalanx. *Period of incubation*, eight days. *Day of first injection*, first day. *Method of administration*, intravenous. *Amount*, 5.0. *Make*, Behring. *Other treatment*, morphine and chloral. *Result*, death.

No. 176.—*Name*, Schubert.<sup>222</sup> *Year*, 1898. *Diagnosis*, Tetanus trau-

maticus. *Nature of injury*, lacerated wound of foot. *Period of incubation*, seven days. *Day of first injection*, tenth hour. *Method of administration*, subcutaneous. *Amount*, 5.0. *Make*, Behring. *Other treatment*, morphine. *Result*, death. *Remarks*. Injection made in this case very early, only ten hours, but patient died in spite of it.

No. 177.—*Name*, Hale.<sup>223</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, abrasion of nose. *Period of incubation*, thirteen days. *Day of first injection*, sixth day. *Method of administration*, subcutaneous. *Amount*, 210 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral, NaBr, morphine, atropine. *Result*, recovery.

No. 178.—*Name*, Morgan.<sup>224</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of eyelid. *Period of incubation*, seven days. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 40 cubic centimetres. *Make*, not stated. *Other treatment*, chloral, KBr, anesthetics. *Result*, death.

No. 179.—*Name*, Barrow.<sup>225</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, punctured wound of thumb. *Period of incubation*, about three weeks. *Day of first injection*, seventh day. *Method of administration*, subcutaneous. *Amount*, not stated. *Make*, British Institute of Preventive Medicine. *Other treatment*, KBr, bromidia. *Result*, recovery.

No. 180.—*Name*, Trevithick.<sup>226</sup> *Year*, 1898. *Diagnosis*, Tetanus(?). *Nature of injury*, cause not discovered. *Period of incubation*, unknown. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 30 cubic centimetres. *Make*, not stated. *Other treatment*, KBr, chloral, anesthesia. *Result*, death. *Remarks*. From the description of the case, the diagnosis does not appear to be certain.

No. 181.—*Name*, Willett.<sup>227</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of finger. *Period of incubation*, about sixteen days. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 90 cubic centimetres. *Make*, British Institute of Preventive Medicine. *Other treatment*, chloral, morphine. *Result*, recovery. *Remarks*. No improvement was noticed while the injections were given; after discontinuing it, chloral was given with good effect.

No. 182.—*Name*, Sime.<sup>228</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of hand. *Period of incubation*, ten days. *Day of first injection*, ninth day. *Method of administration*, subcutaneous. *Amount*, 20 cubic centimetres. *Make*, not stated. *Other treatment*, chloral, morphine, opium, KBr, cannabis indica. *Result*, recovery.

No. 183.—*Name*, Stoneham.<sup>229</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, extensive injury of forearm. *Period of incubation*, seven days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 35 cubic centimetres. *Make*, British Institute of Preventive Medicine. *Other treatment*, chloral, KBr. *Result*, death. *Remarks*. Tetanus bacilli found and cultivated.

No. 184.—*Name*, Brooks.<sup>230</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, contused wound of thumb. *Period of incubation*, ten days. *Day of first injection*, second day. *Method of administration*,

tion, subcutaneous. *Amount*, 170 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral, morphine, bromides. *Result*, recovery.

No. 185.—*Name*, Patteson.<sup>221</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, not stated. *Period of incubation*, eleven days. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 230 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, not stated. *Result*, recovery.

No. 186.—*Name*, Patteson.<sup>221</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, not stated. *Period of incubation*, twelve days. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 180 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, not stated. *Result*, recovery.

No. 187. *Name*, Hy. Croly.<sup>222</sup> *Year*, 1898. *Diagnosis*, Tetanus cephalicus. *Nature of injury*, not stated. *Period of incubation*, shortly after. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, not stated. *Make*, not stated. *Other treatment*, not stated. *Result*, recovery.

No. 188.—*Name*, Hy. G. Croly.<sup>222</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, not stated. *Period of incubation*, not stated. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Other treatment*, not stated. *Result*, death.

No. 189.—*Name*, Denham.<sup>221</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, not stated. *Period of incubation*, not stated. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, not stated. *Make*, not stated. *Other treatment*, not stated. *Result*, death.

No. 190.—*Name*, Myles.<sup>223</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, not stated. *Period of incubation*, not stated. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, not stated. *Make*, not stated. *Other treatment*, not stated. *Result*, recovery.

No. 191.—*Name*, McCausland.<sup>224</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, not stated. *Period of incubation*, not stated. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, one injection. *Make*, some French make. *Other treatment*, bromidia. *Result*, recovery. *Remarks*. Questionable case.

No. 192.—*Name*, Curnow.<sup>227</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of thumb. *Period of incubation*, four days. *Day of first injection*, fourth day. *Method of administration*, subcutaneous. *Amount*, 30 cubic centimetres. *Make*, British Institute of Preventive Medicine. *Other treatment*, not stated. *Result*, death. *Remarks*. Tetanus bacilli found at seat of injury.

No. 193.—*Name*, Greenwood.<sup>225</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, chronic ulcer of leg. *Period of incubation*, unknown. *Day of first injection*, fourth day. *Method of administration*, subcutaneous. *Amount*, 13.5 cubic centimetres. *Make*, Tizzoni. *Amount*, 180 cubic centimetres. *Make*, British Institute of Preventive Medicine. *Other treatment*, chloral, KBr, morphine, anaesthesia. *Result*, recovery.

No. 194.—*Name*, Greenwood.<sup>238</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, chronic ulcer of leg. *Period of incubation*, unknown. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 100 cubic centimetres. *Make*, British Institute of Preventive Medicine. *Other treatment*, chloral, bromidia, morphine. *Result*, death.

No. 195.—*Name*, Mixer.<sup>239</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, incised wound of foot, caused by a piece of glass. *Period of incubation*, eight days. *Day of first injection*, second day. *Method of administration*, subcutaneous and intravenous. *Amount*, 3290 cubic centimetres. *Make*, Massachusetts State Board, and 100 cubic centimetres. *Make*, Gibier. *Other treatment*, morphine, KBr, chloral, paraldehyde, anæsthesia. *Result*, recovery. *Remarks*. Author says this was not a chronic case, and that cases of similar severity in the Massachusetts General Hospital usually died; he also says that the antitoxin was responsible for the recovery. According to author, the serum used was a weak preparation; stronger ones would be better; but even the weak ones are good, provided only sufficient is used (3290!).

No. 196.—*Name*, Lund.<sup>240</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound over occiput and malar bone. *Period of incubation*, five days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 470 cubic centimetres. *Make*, Massachusetts State Board of Health. *Other treatment*, KBr. *Result*, recovery. *Remarks*. Author does not class this case with the acute ones, in spite of short period of incubation.

No. 197.—*Name*, Lund.<sup>240</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, punctured wound of toe, caused by stepping on a nail. *Period of incubation*, six days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 400 cubic centimetres. *Make*, Massachusetts State Board of Health. *Other treatment*, morphine. *Result*, death.

No. 198.—*Name*, Homans.<sup>241</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, crushed injury of legs, with subsequent amputation. *Period of incubation*, nine days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 260 cubic centimetres. *Make*, Roux, and 240 cubic centimetres. *Make*, Massachusetts State Board. *Other treatment*, morphine, chloral, anæsthesia. *Result*, death. *Remarks*. Tetanus bacilli found in the pus.

No. 199.—*Name*, Homans.<sup>241</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, crushed injury of legs, with subsequent amputation. *Period of incubation*, nine days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 80 cubic centimetres. *Make*, Massachusetts State Board. *Other treatment*, not stated. *Result*, death.

No. 200.—*Name*, Riese.<sup>242</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, scratch injury of chin. *Period of incubation*, unknown. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 7.0. *Make*, Behring. *Other treatment*, not stated.

*Result, recovery. Remarks.* Author says it was undoubtedly a bad case, and cure can be ascribed only to the antitoxin.

No. 201.—*Name, Beuthner.*<sup>23</sup> *Year, 1898. Diagnosis, Tetanus traumaticus. Nature of injury, incised wound of foot by stepping on glass. Period of incubation, five and a half days. Day of first injection, second day. Method of administration, subcutaneous. Amount, 5.0. Make, Behring. Other treatment, chloral. Result, death. Remarks.* Author says it was a very bad case, but also that the antitoxin had no effect on the bad result.

No. 202.—*Name, Patteson.*<sup>24</sup> *Year, 1898. Diagnosis, Tetanus traumaticus. Nature of injury, punctured wound of foot, caused by stepping on a thorn. Period of incubation, eleven days. Day of first injection, first day. Method of administration, subcutaneous. Amount, 15 grains. Make, not stated. Amount, 240 cubic centimetres. Make, Paris Institute Pasteur. Other treatment, chloral, KBr. Result, recovery. Remarks.* Author says that neither of these cases was very bad, but he has seen similar cases run a fatal course.

No. 203.—*Name, Patteson.*<sup>24</sup> *Year, 1898. Diagnosis, Tetanus traumaticus. Nature of injury, injury to knee. Period of incubation, about a fortnight. Day of first injection, soon. Method of administration, subcutaneous. Amount, 130 cubic centimetres. Make, Paris Institute Pasteur. Other treatment, chloral and bromidia. Result, recovery.*

No. 204.—*Name, Patteson.*<sup>24</sup> *Year, 1898. Diagnosis, Tetanus traumaticus. Nature of injury, punctured wound of foot, caused by stepping on a nail. Period of incubation, about thirty hours. Day of first injection, at once. Method of administration, subcutaneous. Amount, 10 cubic centimetres. Make, Paris Institute Pasteur. Other treatment, chloral, KBr. Result, death. Remarks.* The following points are remarkable about this case:

(1) The terrible suddenness of the onset within thirty hours after the trauma.

(2) The inefficiency of the serum, though used early and frequently.

(3) Excised skin around wound showed almost a pure culture of tetanus bacilli.

No. 205.—*Name, Potechin.*<sup>26</sup> *Year, 1898. Diagnosis, Tetanus traumaticus. Nature of injury, not stated. Period of incubation, not stated. Day of first injection, not stated. Method of administration, not stated. Amount, not stated. Make, not stated. Other treatment, chloral. Result, recovery. Remarks.* Only a small reference. Original. *Djetskaja Medicina*, 1898, Nos. 4 and 5, not obtainable.

No. 206.—*Name, Carbognin.*<sup>27</sup> *Year, 1898. Diagnosis, Tetanus traumaticus. Nature of injury, punctured wound of foot. Period of incubation, ten days. Day of first injection, fifth day. Method of administration, subcutaneous. Amount, 9.0. Make, Tizzoni. Other treatment, chloral, morphine. Result, recovery. Remarks.* Author says that he has no doubt that the recovery was due to the antitoxin.

No. 207.—*Name, Heddaeus.*<sup>28</sup> *Year, 1898. Diagnosis, Tetanus traumaticus. Nature of injury, lacerated wound of elbow. Period of incuba-*

tion, nine days. *Day of first injection*, fifth day. *Method of administration*, intravenous. *Amount*, 15.0. *Make*, Behring. *Other treatment*, chloral. *Result*, recovery. *Remarks*. Author says this case was a medium grave one, with a poor prognosis; the antitoxin doubtlessly had a good effect.

No. 208.—*Name*, Heddaeus.<sup>218</sup> *Year*, 1898. *Diagnosis*, Tetanus cephalicus. *Nature of injury*, numerous wounds of face, caused by an explosion. *Period of incubation*, four and a half days. *Day of first injection*, at once. *Method of administration*, intravenous, subcutaneous. *Amount*, 5.0, 5.0 respectively. *Make*, Behring. *Other treatment*, chloral, opium. *Result*, recovery. *Remarks*. Author counts this case to the grave ones, and says that it is undeniable that in this case also the antitoxin had a distinct curative effect and patient was saved only by its use.

No. 209.—*Name*, Heddaeus.<sup>219</sup> *Year*, 1898. *Diagnosis*, Tetanus cephalicus. *Nature of injury*, slight injury of lower lip, caused by a whip. *Period of incubation*, five days. *Day of first injection*, second day. *Method of administration*, intravenous. *Amount*, 50 cubic centimetres. *Make*, Behring. *Other treatment*, chloral, opium, morphine. *Result*, death. *Remarks*. Author counts this case to the very grave ones, but says this case should not speak against the use of antitoxin, because it was used too late, and in insufficient amount.

No. 210.—*Name*, Bousquet.<sup>219</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of hand. *Period of incubation*, eight days. *Day of first injection*, sixth day. *Method of administration*, subcutaneous. *Amount*, 120 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral. *Result*, recovery.

No. 211.—*Name*, Kochler.<sup>220</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of thigh. *Period of incubation*, eight days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 5.0. *Make*, Behring. *Amount*, 4.5. *Make*, Tizzoni. *Other treatment*, morphine. *Result*, death.

No. 212.—*Name*, Koehler.<sup>220</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, probably an ulcer of tongue. *Period of incubation*, unknown. *Day of first injection*, fifth day. *Method of administration*, subcutaneous. *Amount*, 4.5. *Make*, Tizzoni, and 1000 units. *Make*, Behring. *Other treatment*, not stated. *Result*, death.

No. 213.—*Name*, Koehler.<sup>220</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, ulcer of leg. *Period of incubation*, unknown. *Day of first injection*, eighth day. *Method of administration*, subcutaneous. *Amount*, 75 cubic centimetres. *Make*, Behring. *Other treatment*, not stated. *Result*, recovery. *Remarks*. Mild case.

No. 214.—*Name*, Stintzing.<sup>221</sup> *Year*, 1898. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of thigh. *Period of incubation*, eight days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 5.0. *Make*, Behring, and 4.5. *Make*, Tizzoni. *Other treatment*, morphine. *Result*, death.

No. 215.—*Name*, Stintzing.<sup>221</sup> *Year*, 1898. *Diagnosis*, Tetanus(?). *Nature of injury*, seat not found. *Period of incubation*, unknown. *Day of first injection*, fifth day. *Method of administration*, subcutaneous.



*Amount, 4.5. Make, Tizzoni. Amount, 10.0. Make, Behring. Other treatment, not stated. Result, death.*

No. 216.—*Name, Barth.*<sup>222</sup> *Year, 1898. Diagnosis, Tetanus traumaticus. Nature of injury, excoriations on body. Period of incubation, seven days. Day of first injection, second day. Method of administration, subcutaneous. Amount, 300 cubic centimetres. Make, Roux. Other treatment, chloral and KBr. Result, recovery.*

No. 217.—*Name, Capelli.*<sup>223</sup> *Year, 1898. Diagnosis, Tetanus traumaticus. Nature of injury, gunshot wound of shoulder. Period of incubation, fourteen days. Day of first injection, fifth day. Method of administration, subcutaneous. Amount, 3,600,000 units. Make, Tizzoni. Other treatment, chloral, Baccelli. Result, recovery.*

No. 218.—*Name, de Yoanna.*<sup>224</sup> *Year, 1899. Diagnosis, Tetanus traumaticus. Nature of injury, injury of finger. Period of incubation, eight days. Day of first injection, ninth day. Method of administration, subcutaneous. Amount, 280 cubic centimetres. Make, New York Board of Health. Other treatment, chloral, morphine. Result, recovery.*

No. 219.—*Name, H. Copley.*<sup>225</sup> *Year, 1899. Diagnosis, Tetanus traumaticus. Period of incubation, ten days. Day of first injection, not stated. Method of administration, subcutaneous. Amount, begins with 30 cubic centimetres, and repeated two or three times a day. Make, Tizzoni. Other treatment, KBr. Result, recovery.*

No. 220.—*Name, H. Copley.*<sup>226</sup> *Year, 1899. Diagnosis, Tetanus traumaticus. Period of incubation, not stated. Day of first injection, not stated. Method of administration, subcutaneous. Make, Tizzoni and British Institute of Preventive Medicine. Result, recovery.*

No. 221.—*Name, H. Copley.*<sup>227</sup> *Year, 1899. Diagnosis, Tetanus traumaticus. Period of incubation, not stated. Day of first injection, not stated. Method of administration, subcutaneous. Make, British Institute of Preventive Medicine. Result, recovery.*

No. 222.—*Name, H. Copley.*<sup>228</sup> *Year, 1899. Diagnosis, Tetanus traumaticus. Period of incubation, not stated. Day of first injection, not stated. Method of administration, subcutaneous. Make, British Institute of Preventive Medicine. Result, death. Remarks. Author says that the antitoxin was used too late in this case.*

No. 223.—*Name, Clark.*<sup>229</sup> *Year, 1899. Diagnosis, Tetanus traumaticus. Nature of injury, punctured wound of finger. Period of incubation, six days. Day of first injection, second day. Method of administration, subcutaneous. Amount, 50 cubic centimetres. Make, not stated. Other treatment, chloral and KBr. Result, death.*

No. 224.—*Name, Galletly.*<sup>230</sup> *Year, 1899. Diagnosis, Tetanus traumaticus. Nature of injury, lacerated wound of finger. Period of incubation, nineteen days. Day of first injection, second day. Method of administration, subcutaneous. Amount, 240 cubic centimetres. Make, British Institute of Preventive Medicine. Other treatment, chloral and KBr. Result, recovery. Remarks. Evidently a mild case.*

No. 225.—*Name, Marshall.*<sup>231</sup> *Year, 1899. Diagnosis, Tetanus traumaticus. Nature of injury, burn. Period of incubation, fourteen days. Day of first injection, not stated. Method of administration, subcutane-*

ous. *Amount*, 110 cubic centimetres. *Make*, not stated. *Other treatment*, chloral and KBr. *Result*, recovery. *Remarks*. Author believes that the antitoxin was the principal curative agent, and says it is particularly useful in the more chronic cases, *i.e.*, in those with a period of incubation of more than ten days.

No. 226.—*Name*, Berry.<sup>299</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of great toe. *Period of incubation*, six days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 35 cubic centimetres. *Make*, British Institute of Preventive Medicine. *Other treatment*, chloral, KBr, morphine. *Result*, death. *Remarks*. Death twenty-seven hours after onset.

No. 227.—*Name*, Wace.<sup>300</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of leg. *Period of incubation*, seven days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 20 cubic centimetres. *Make*, not stated. *Other treatment*, chloral, KBr, morphine. *Result*, death. *Remarks*. Patient died only eleven hours after onset; evidently a very acute onset.

No. 228.—*Name*, Taylor.<sup>301</sup> *Year*, 1899. *Diagnosis*, Tetanus puerperalis. *Nature of injury*, abortion. *Period of incubation*, about five days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 10 cubic centimetres. *Make*, Parke, Davis & Co. *Other treatment*, curettage, chloral, KBr. *Result*, recovery. *Remarks*. Although author argues for it, judging from the description of the case, the diagnosis is not by any means certain.

No. 229.—*Name*, Cane.<sup>302</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, compound dislocation of phalanx. *Period of incubation*, seven days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 40 cubic centimetres. *Make*, British Institute of Preventive Medicine. *Other treatment*, chloral, KBr. *Result*, death.

No. 230.—*Name*, Mackey.<sup>303</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, crushing of little finger. *Period of incubation*, two weeks. *Day of first injection*, one week. *Method of administration*, subcutaneous. *Amount*, about 120 cubic centimetres. *Make*, British Institute of Preventive Medicine. *Other treatment*, very little chloral, KBr. *Result*, recovery. *Remarks*. Author says in this case the antitoxin was given a good trial, as very little medication was used.

No. 231.—*Name*, Mills.<sup>304</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of heel. *Period of incubation*, six days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 30 cubic centimetres. *Make*, British Institute of Preventive Medicine. *Other treatment*, bromidia, KBr, chloral, opium. *Result*, death. *Remarks*. Author thinks that the amount used was too small, as it appeared to him that the antitoxin certainly did some good.

No. 232.—*Name*, Rice.<sup>305</sup> *Year*, 1899. *Diagnosis*, Tetanus(?). *Nature of injury*, stomatitis(?). *Period of incubation* (?). *Day of first injection*, on day of absolute diagnosis. *Method of administration*, subcutaneous. *Amount*, 110 cubic centimetres. *Make*, not stated. *Other treatment*, chloral, bromidia. *Result*, recovery.

No. 233.—*Name*, Fraser.<sup>268</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, scalp wound. *Period of incubation*, fifteen days. *Day of first injection*, fifth day. *Method of administration*, subcutaneous. *Amount*, 80 cubic centimetres. *Make*, British Institute of Preventive Medicine. *Other treatment*, chloral. *Result*, recovery. *Remarks*. Author thinks it is highly probable that the good result was due to the antitoxin.

No. 234.—*Name*, James.<sup>267</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of palm. *Period of incubation*, six days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, not stated, approximately 1245 cubic centimetres. *Make*, not stated. *Other treatment*, gelsemium. *Result*, recovery. *Remarks*. Enormous quantity of antitoxin used; regrettable that make is not stated.

No. 235.—*Name*, Adams.<sup>265</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, toy-pistol injury of palm. *Period of incubation*, thirteen days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 150 cubic centimetres. *Make*, not stated. *Other treatment*, KBr. *Result*, recovery. *Remarks*. The bromide was used only on one day, but it had no effect on the spasms.

No. 236.—*Name*, Packard.<sup>259</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, blank cartridge injury of hand. *Period of incubation*, seven days. *Day of first injection*, not stated. *Method of administration*, not stated. *Amount*, not stated. *Make*, not stated. *Other treatment*, physostigma, bromidia, chloral, morphine. *Result*, death.

No. 237.—*Name*, Packard.<sup>259</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of thigh. *Period of incubation*, not stated. *Day of first injection*, not stated. *Method of administration*, not stated. *Amount*, not stated. *Make*, not stated. *Other treatment*, bromidia, physostigma, Baccelli. *Result*, death.

No. 238.—*Name*, Wagoner.<sup>270</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, crushed wound of foot. *Period of incubation*, thirteen days. *Day of first injection*, fourteenth day. *Method of administration*, subcutaneous. *Amount*, 30.0. *Make*, not stated. *Other treatment*, cocaine, chloral, Baccelli. *Result*, recovery. *Remarks*. This case is of hardly any value in the statistics of antitoxin treatment, as it is possible that the long-continued carbolic injections were the cause of the recovery.

No. 239.—*Name*, Arneill.<sup>271</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, punctured wound of foot, caused by stepping on a rusty nail. *Period of incubation*, eight days. *Day of first injection*, fourth day. *Method of administration*, subcutaneous. *Amount*, 90 cubic centimetres. *Make*, Parke, Davis & Co. *Other treatment*, KBr, chloral, morphine. *Result*, death. *Remarks*. Author concludes by saying, "The failure of the antitoxin to relieve any of the symptoms should be emphasized." He also reports a case of pharyngeal abscess, diagnosed as tetanus, and warns from this mistake.

No. 240.—*Name*, Moeller.<sup>272</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of foot, caused by an iron spike. *Period of incubation*, six days. *Day of first injection*, eighth day.

*Method of administration*, subcutaneous. *Amount*, 28 cubic centimetres. *Make*, Behring. *Other treatment*, morphine. *Result*, death. *Remarks*. Patient died on day of injection.

No. 241.—*Name*, Werner.<sup>273</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, crushed injury of thumb. *Period of incubation*, six days. *Day of first injection*, fourth day. *Method of administration*, subcutaneous. *Amount*, 31.5. *Make*, Behring. *Other treatment*, morphine, chloral. *Result*, death. *Remarks*. Tetanus bacilli found in the wound. Author says that the prognosis was very doubtful from the beginning, and that the chances for recovery poor, as the antitoxin was obtained too late.

No. 242.—*Name*, Hönn.<sup>274</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of finger. *Period of incubation*, ten days. *Day of first injection*, fifth day. *Method of administration*, subcutaneous. *Amount*, one dose. *Make*, Tizzoni, and one dose. *Make*, Behring. *Other treatment*, morphine, chloral. *Result*, recovery. *Remarks*. Author will not say how much and whether the antitoxin aided in the recovery.

No. 243.—*Name*, Wullenweber.<sup>275</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, abrasion on back of hand. *Period of incubation*, two to three weeks. *Day of first injection*, fifth day. *Method of administration*, subcutaneous. *Amount*, 75 cubic centimetres. *Make*, not stated. *Other treatment*, chloral, etc. *Result*, recovery. *Remarks*. A long period of incubation, but in spite of this a very bad case and patient was once thought to be dying. Author also says that, without detracting from the antitoxin, the chloral bore a great share in the recovery, but it alone would not have saved the patient, and credit should be given to both.

No. 244.—*Name*, Engelen.<sup>276</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of finger. *Period of incubation*, five days. *Day of first injection*, fifth day. *Method of administration*, subcutaneous. *Amount*, 50 cubic centimetres. *Make*, Behring. *Other treatment*, chloral, morphine. *Result*, recovery. *Remarks*. Author says that, judging from the period of incubation and the cause, he should say this was a very bad case, and that other cases of same severity in his experience died. Good result was due to the antitoxin, and its continued use is urged.

No. 245.—*Name*, Kleine.<sup>277</sup> *Year*, 1899. *Diagnosis*, Tetanus(?). *Nature of injury*, inflamed nœvus of thigh. *Period of incubation*, unknown. *Day of first injection*, fourth day. *Method of administration*, subcutaneous. *Amount*, 112 cubic centimetres. *Make*, Behring. *Other treatment*, chloral. *Result*, recovery. *Remarks*. Tetanus bacilli found in the excised nœvus.

No. 246.—*Name*, Kleine.<sup>277</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of foot. *Period of incubation*, two or three weeks. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 40 cubic centimetres. *Make*, Behring. *Other treatment*, chloral. *Result*, recovery. *Remarks*. Case was very bad

in spite of long period of incubation; cure was due solely to the anti-toxin.

No. 247.—*Name*, Pitha.<sup>218</sup> *Year*, 1899. *Diagnosis*, Tetanus puerperalis. *Nature of injury*, forceps delivery and suture of perineum. *Period of incubation*, eight days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 22.0. *Make*, Tizzoni. *Other treatment*, chloral, anæsthesia. *Result*, death. *Remarks*. Tetanus bacilli found in the lochia.

No. 248.—*Name*, Pitha.<sup>218</sup> *Year*, 1899. *Diagnosis*, Tetanus puerperalis. *Nature of injury*, breech delivery. *Period of incubation*, eight days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 20.0. *Make*, Tizzoni. *Other treatment*, chloral, anæsthesia. *Result*, death. *Remarks*. Tetanus bacilli found in the lochia. Previously to these two cases there was another case of puerperal tetanus in the same (Pawlik's) clinic, and it is presumable that these two cases were infected by a double current catheter used on all, in spite of the fact that it was sterilized by boiling; possible that the boiling was insufficient to kill the tetanus spores.

No. 249.—*Name*, Pitha.<sup>218</sup> *Year*, 1899. *Diagnosis*, Tetanus puerperalis. *Nature of injury*, craniotomy. *Period of incubation*, eight days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 530.0. *Make*, Bujwid. *Other treatment*, not stated. *Result*, death. *Remarks*. Tetanus bacilli found in the extirpated uterus. Author thinks it is possible that this case was also infected from the previous one.

No. 250.—*Name*, Pitha.<sup>218</sup> *Year*, 1899. *Diagnosis*, Tetanus puerperalis. *Nature of injury*, forceps delivery and suture of perineum. *Period of incubation*, eight days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 100.0. *Make*, Bujwid. *Other treatment*, not stated. *Result*, death. *Remarks*. No tetanus bacilli were found in the extirpated uterus, but they were found in the perineal wound. Author says it is not impossible that, in spite of all precautions, this case was also infected from the previous ones.

No. 251.—*Name*, Pitha.<sup>218</sup> *Year*, 1899. *Diagnosis*, Tetanus puerperalis. *Nature of injury*, low forceps. *Period of incubation*, six days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 20 cubic centimetres. *Make*, not stated. *Result*, death. *Remarks*. Patient was removed from the clinic.

No. 252.—*Name*, Gessner.<sup>219</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, burn of second and third degree. *Period of incubation*, eight days. *Day of first injection*, sixth day. *Method of administration*, subcutaneous. *Amount*, 80.0. *Make*, Behring. *Other treatment*, morphine. *Result*, death. *Remarks*. Case treated in 1893.

No. 253.—*Name*, Gessner.<sup>219</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound over temporal region. *Period of incubation*, nine days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 15 cubic centimetres. *Make*, Behring. *Other treatment*, morphine, chloral, anæsthesia. *Result*, death.

No. 254.—*Name*, Slawyk.<sup>220</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of foot. *Period of incubation*,

not stated. *Day of first injection*, not stated. *Method of administration*, subcutaneous and lumbar. *Amount*, not stated. *Make*, Tizzoni. *Other treatment*, not stated. *Result*, death. *Remarks*. Guinea-pig infected with the splinter died in sixteen hours of tetanus.

No. 255.—*Name*, Czynharz.<sup>251</sup> *Year*, 1899. *Diagnosis*, Tetanus cephalicus. *Nature of injury*, injury of scalp. *Period of incubation*, fourteen days. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, not stated. *Make*, Tizzoni. *Other treatment*, chloral and KBr. *Result*, recovery. *Remarks*. Original not found. Referat in *Berliner klinische Wochenschrift*, 1899, p. 62. Author says cure was not entirely due to the antitoxin, as good effect was seen also from the chloral.

No. 256.—*Name*, Holsti.<sup>252</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, incised wound of thumb. *Period of incubation*, three to four weeks. *Day of first injection*, sixteenth day. *Method of administration*, subcutaneous. *Amount*, 5.0. *Make*, Behring. *Other treatment*, chloral, morphine. *Result*, recovery. *Remarks*. A very chronic and mild case with long period of incubation.

No. 257.—*Name*, Holsti.<sup>253</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, punctured wound of foot. *Period of incubation*, two weeks. *Day of first injection*, eighth day. *Method of administration*, subcutaneous. *Amount*, 5.0. *Make*, Behring. *Other treatment*, chloral, morphine. *Result*, recovery. *Remarks*. Also a mild and chronic case. Author says he saw no marked effect from the antitoxin.

No. 258.—*Name*, Thieme.<sup>254</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of orbit and eyelids. *Period of incubation*, four days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 2.5. *Make*, Behring. *Other treatment*, not stated. *Result*, death. *Remarks*. Death only a few hours after injection.

No. 259.—*Name*, Krausz.<sup>255</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, abrasion on elbow. *Period of incubation*, six days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 10.0. *Make*, Tizzoni. *Other treatment*, not stated. *Result*, recovery. *Remarks*. A mild case in spite of short period of incubation.

No. 260.—*Name*, Krausz.<sup>256</sup> *Year*, 1899. *Diagnosis*, Tetanus(?). *Nature of injury*, cause not discovered. *Period of incubation*, unknown. *Day of first injection*, fourth day. *Method of administration*, subcutaneous. *Amount*, 13.5. *Make*, Tizzoni. *Other treatment*, urethan. *Result*, recovery.

No. 261.—*Name*, Krausz.<sup>257</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of heel. *Period of incubation*, unknown. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 26.0. *Make*, Tizzoni. *Other treatment*, chloral. *Result*, recovery. *Remarks*. Mouse inoculated with the splinter died of typical tetanus.

No. 262.—*Name*, Krausz.<sup>258</sup> *Year*, 1899. *Diagnosis*, Tetanus puerilis. *Nature of injury*, laceration of perineum. *Period of incubation*,

seven days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 16.0. *Make*, Tizzoni. *Other treatment*, urethan, morphine. *Result*, death. *Remarks*. No tetanus bacilli found, and a mouse infected also proved negative; but author says there is no doubt regarding the diagnosis.

No. 263.—*Name*, Krausz.<sup>251</sup> *Year*, 1899. *Diagnosis*, Tetanus puerperalis. *Nature of injury*, version for impacted breech presentation. *Period of incubation*, nine days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 2.0. *Make*, Tizzoni. *Other treatment*, not stated. *Result*, death. *Remarks*. Mouse inoculated with the secretions from the cervix died of tetanus.

No. 264.—*Name*, Krausz.<sup>251</sup> *Year*, 1899. *Diagnosis*, Tetanus puerperalis. *Nature of injury*, craniotomy. *Period of incubation*, six days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 94.5 cubic centimetres. *Make*, Behring, and 4.5. *Make*, Tizzoni. *Other treatment*, urethan. *Result*, death. *Remarks*. Mice inoculated with the blood of this patient died of typical tetanus. Tetanus bacilli found post mortem in lochia.

No. 265.—*Name*, Krausz.<sup>251</sup> *Year*, 1899. *Diagnosis*, Tetanus puerperalis. *Nature of injury*, tamponade of uterus for post-partum hæmorrhage. *Period of incubation*, ten days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 157.5. *Make*, Behring, also 7.0. *Make*, Tizzoni, and 60 cubic centimetres. *Make*, Paltauf. *Other treatment*, not stated. *Result*, death. *Remarks*. Tetanus bacilli found.

No. 266.—*Name*, Haberling.<sup>252</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of foot. *Period of incubation*, thirteen days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 5.0. *Make*, Behring, also 50 cubic centimetres. *Make*, Behring. *Other treatment*, chloral, morphine. *Result*, recovery. *Remarks*. Author says, a very bad case, and recovery greatly due to the antitoxin combined with narcotics.

No. 267.—*Name*, Haberling.<sup>253</sup> *Year*, 1899. *Diagnosis*, Tetanus cephalicus. *Nature of injury*, injury of eye and orbit, caused by kick of a horse. *Period of incubation*, six days. *Day of first injection*, eighth day. *Method of administration*, subcutaneous. *Amount*, 50 cubic centimetres. *Make*, Behring. *Other treatment*, chloral, morphine. *Result*, recovery. *Remarks*. Case complicated by erysipelas.

No. 268.—*Name*, Leick.<sup>254</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of palm. *Period of incubation*, unknown. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 10.0. *Make*, Behring. *Other treatment*, chloral and morphine. *Result*, death.

No. 269.—*Name*, Tavel.<sup>255</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of finger. *Period of incubation*, twenty-three days. *Day of first injection*, fifth day. *Method of administration*, subcutaneous. *Amount*, ten doses. *Make*, Tavel. *Other treatment*, chloral. *Result*, recovery.

No. 270.—*Name*, Tavel.<sup>255</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of hand. *Period of incubation*, thir-

teen days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 16 doses. *Make*, Tavel. *Other treatment*, not stated. *Result*, recovery.

No. 271.—*Name*, Tavel.<sup>327</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of finger. *Period of incubation*, about six weeks. *Day of first injection*, thirteenth day. *Method of administration*, subcutaneous. *Amount*, 24 doses. *Make*, Tavel. *Other treatment*, not stated. *Result*, recovery. *Remarks*. A very bad case in spite of long period of incubation, followed by recovery, due entirely to the antitoxin.

No. 272.—*Name*, Tavel.<sup>327</sup> *Year*, 1899. *Diagnosis*, Tetanus cephalicus. *Nature of injury*, lacerated wound of forehead. *Period of incubation*, ten days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 10 doses. *Make*, Tavel. *Other treatment*, not stated. *Result*, recovery.

No. 273.—*Name*, Tavel.<sup>327</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, crushed wound of finger. *Period of incubation*, three days. *Day of first injection*, few hours. *Method of administration*, subcutaneous. *Amount*, 50 cubic centimetres. *Make*, Tavel. *Other treatment*, not stated. *Result*, recovery. *Remarks*. Cured in one hour after injection. Author says that result was wonderful, but he also expresses some doubt as regards diagnosis.

No. 274.—*Name*, Tavel.<sup>327</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, pistol-shot wound of hand. *Period of incubation*, eight days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 6 doses. *Make*, Tavel. *Other treatment*, not stated. *Result*, death.

No. 275.—*Name*, Tavel.<sup>327</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, compound fracture of forearm. *Period of incubation*, not stated. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, not stated. *Make*, Tavel. *Other treatment*, not stated. *Result*, death. *Remarks*. Antitoxin was used too late.

No. 276.—*Name*, Tavel.<sup>327</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of scalp. *Period of incubation*, six days. *Day of first injection*, second day. *Method of administration*, subcutaneous and intravenous. *Amount*, 50 cubic centimetres. *Make*, Tavel. *Amount*, 100 cubic centimetres respectively. *Make*, Tavel. *Other treatment*, not stated. *Result*, death. *Remarks*. Mice inoculated with the pus died of tetanus.

No. 277.—*Name*, Alessandrini.<sup>281</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of great toe. *Period of incubation*, eight days. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 25 cubic centimetres. *Make*, Tizzoni. *Other treatment*, Baccelli, etc. *Result*, recovery. *Remarks*. Author says recovery was entirely due to the antitoxin.

No. 278.—*Name*, Bernhart.<sup>259</sup> *Year*, 1899. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, abrasion of skin. *Period of incubation*, one day. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 55 cubic centimetres. *Make*, Roux. *Other treatment*, not stated. *Result*, recovery. *Remarks*. Original not obtainable.



No. 279.—*Name*, Müller.<sup>289</sup> *Year*, 1900. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, splinter injury of thumb. *Period of incubation*, ten days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 62 cubic centimetres. *Make*, Behring. *Other treatment*, chloralamid, morphine. *Result*, death. *Remarks*. Tetanus bacilli found in the wound and splinter inoculations also gave a positive result.

No. 280.—*Name*, Müller.<sup>290</sup> *Year*, 1900. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of foot by a knife. *Period of incubation*, unknown. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 155 cubic centimetres. *Make*, Behring. *Other treatment*, chloral, morphine. *Result*, recovery. *Remarks*. A very chronic case.

No. 281.—*Name*, Van Camp.<sup>291</sup> *Year*, 1900. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of foot by a knife. *Period of incubation*, eleven days. *Day of first injection*, tenth day. *Method of administration*, subcutaneous. *Amount*, 50 cubic centimetres. *Make*, not stated. *Other treatment*, morphine, KBr, hyoscyamus. *Result*, recovery.

No. 282.—*Name*, Murray.<sup>292</sup> *Year*, 1900. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of foot by a stone. *Period of incubation*, nine to ten days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 90 cubic centimetres. *Make*, not stated. *Other treatment*, chloral and bromidia. *Result*, recovery. *Remarks*. Author says he is compelled to assume that the serum had a great deal to do with the recovery.

No. 283.—*Name*, Willis.<sup>293</sup> *Year*, 1900. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, abrasion over patella. *Period of incubation*, ten days. *Day of first injection*, first day. *Method of administration*, intravenous and subcutaneous. *Amount*, 200 cubic centimetres. *Make*, Institute Pasteur and British Institute of Preventive Medicine. *Other treatment*, chloral, morphine, hyoscyamus. *Result*, recovery. *Remarks*. Author says that he is not satisfied that the recovery was due solely to the antitoxin, though he would use it in every case.

No. 284.—*Name*, Willy Meyer.<sup>294</sup> *Year*, 1900. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, pistol-shot wound. *Period of incubation*, seven days. *Day of first injection*, not stated. *Method of administration*, subcutaneous. *Amount*, 120 cubic centimetres. *Make*, Paris Institute Pasteur. *Other treatment*, chloral, bromidia, Baccelli. *Result*, recovery.

No. 285.—*Name*, Baracchini.<sup>295</sup> *Year*, 1900. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, punctured wound of foot. *Period of incubation*, seventeen days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 50 cubic centimetres. *Make*, Tizzoni. *Other treatment*, chloral. *Result*, recovery. *Remarks*. Judging from the description, a very grave case followed by quick recovery and, according to author, due solely to the antitoxin.

No. 286.—*Name*, Abbe.<sup>296</sup> *Year*, 1900. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, pistol-shot wound of thigh. *Period of incubation*, sixteen days. *Day of first injection*, third day. *Method of administration*, subcutaneous. *Amount*, 160 cubic centimetres. *Make*, New York Board

of Health. *Other treatment*, chloral, bromide, morphine. *Result*, death. *Remarks*. A case with a long period of incubation. Of the antitoxin, the author says that it seemed at first to have some control over the spasms, but failed afterwards to show appreciable value.

No. 287.—*Name*, Abbe.<sup>293</sup> *Year*, 1900. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, injury of foot caused by a nail. *Period of incubation*, six days. *Day of first injection*, first day. *Method of administration*, subcutaneous. *Amount*, 120 cubic centimetres. *Make*, New York Board of Health. *Other treatment*, chloral, bromide, morphine. *Result*, death. *Remarks*. Author says this case proves the inefficiency of the New York Board of Health serum, if used subcutaneously and in moderate quantity, in a grave case.

No. 288.—*Name*, Abbe.<sup>293</sup> *Year*, 1900. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, toy-pistol injury of finger. *Period of incubation*, five days. *Day of first injection*, second day. *Method of administration*, subcutaneous. *Amount*, 20 cubic centimetres. *Make*, New York Board of Health. *Other treatment*, chloral, bromides. *Result*, death.

No. 289.—*Name*, Abbe.<sup>293</sup> *Year*, 1900. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, toy-pistol injury of palm. *Period of incubation*, eleven days. *Day of first injection*, fifteenth day. *Method of administration*, subcutaneous. *Amount*, exact amount not stated. *Make*, Parke, Davis & Co. *Other treatment*, chloral, bromides. *Result*, recovery. *Remarks*. According to author, a milder case, but well influenced by Parke, Davis & Co.'s antitoxin.

No. 290.—*Name*, Crone.<sup>296</sup> *Year*, 1900. *Diagnosis*, Tetanus traumaticus. *Nature of injury*, lacerated wound of scalp. *Period of incubation*, twelve days. *Day of first injection*, fourth day. *Method of administration*, subcutaneous. *Amount*, 2 bottles. *Make*, Behring. *Other treatment*, opium. *Result*, recovery. *Remarks*. Author says a very bad case, followed by recovery, although the antitoxin was used quite late.

#### ANALYSIS OF THE PRECEDING CASES.

Total number of cases treated by subcutaneous injections, 290, of which 173 recovered and 117 died, or a mortality of 40.33 per cent. All the observations agree that the period of incubation is of great importance in the prognosis. On tabulating these 290 cases; I find the following values:

Of 1 case with a period of incubation less than 1 day, 1 recovered and 0 died, 0 per cent.; of 3 cases with a period of incubation of 1 day, 2 recovered and 1 died, 33.33 per cent.; of 1 case with a period of incubation of 2 days, 1 recovered and 0 died, 0 per cent.; of 2 cases with a period of incubation of 3 days, 2 recovered and 0 died, 0 per cent.; of 11 cases with a period of incubation of 4 days, 6 recovered and 5 died, 45.45 per cent.; of 15 cases with a period of incubation of 5

days, 7 recovered and 8 died, 53.33 per cent.; of 21 cases with a period of incubation of 6 days, 7 recovered and 14 died, 66.66 per cent.; of 28 cases with a period of incubation of 7 days, 14 recovered and 14 died, 50.0 per cent.; of 34 cases with a period of incubation of 8 days, 13 recovered and 21 died, 61.76 per cent.; of 16 cases with a period of incubation of 9 days, 8 recovered and 8 died, 50.0 per cent.; of 15 cases with a period of incubation of 10 days, 10 recovered and 5 died, 33.33 per cent.; of 17 cases with a period of incubation of 11 days, 12 recovered and 5 died, 29.41 per cent.; of 11 cases with a period of incubation of 12 days, 9 recovered and 2 died, 18.18 per cent.; of 14 cases with a period of incubation of 13 days, 12 recovered and 2 died, 14.28 per cent.; of 15 cases with a period of incubation of 14 days, 13 recovered and 2 died, 13.33 per cent.; of 7 cases with a period of incubation of 15 days, 6 recovered and 1 died, 14.28 per cent.; of 2 cases with a period of incubation of 16 days, 1 recovered and 1 died, 50.0 per cent.; of 1 case with a period of incubation of 17 days, 1 recovered and 0 died, 0 per cent.; of 4 cases with a period of incubation of 18 days, 4 recovered and 0 died, 0 per cent.; of 3 cases with a period of incubation of 19 days, 2 recovered and 1 died, 33.33 per cent.; of 14 cases with a period of incubation of over 19 days, 12 recovered and 2 died, 14.28 per cent.; of 30 cases with unknown period of incubation, 19 recovered and 11 died, 36.66 per cent.; of 25 cases in which incubation period is not stated, 11 recovered and 14 died, 56.0 per cent.

On attempting to concentrate these statistics, according to the usually published statistics, we get following values:

Of 33 cases with a period of incubation of less than 5 days, 19 recovered and 14 died, 42.42 per cent.; of 114 cases with a period of incubation of 5-10 days, 52 recovered and 62 died, 54.38 per cent.; of 64 cases with a period of incubation of 10-15 days, 52 recovered and 12 died, 18.75 per cent.; of 24 cases with a period of incubation of over 15 days, 20 recovered and 4 died, 20 per cent.; of 55 cases with unknown or unreported period of incubation, 30 recovered and 25 died, 45.45 per cent.

Total number of cases treated by intracerebral injections 48, of which 23 recovered and 25 died, or a mortality percentage of 52.08.

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- <sup>128</sup> Austin: Boston Medical and Surgical Journal, September 17, 1896.
- <sup>129</sup> Whittington: Boston Medical and Surgical Journal, January 16, 1896.
- <sup>130</sup> Engelmann: Münchner med. Wochenschrift, No. 32, 1897.
- <sup>131</sup> Teichmann: Deutsche med. Wochenschrift, Th. B., No. 5, 1897.
- <sup>132</sup> Kortmann: Deutsche med. Wochenschrift, Th. B., No. 9, 1897.
- <sup>133</sup> Jacob: Deutsche med. Wochenschrift, Th. B., No. 1, 1897.
- <sup>134</sup> Höfling: Deutsche med. Wochenschrift, Th. B., No. 3, 1897.
- <sup>135</sup> Merkel: Münchner med. Wochenschrift, p. 1366, No. 48, 1897.
- <sup>136</sup> Hollis: British Medical Journal, September 11, 1897.
- <sup>137</sup> Beamish: British Medical Journal, October 2, 1897.
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- <sup>139</sup> Proudfoot: British Medical Journal, February 6, 1897.
- <sup>140</sup> Carter: British Medical Journal, April 17, 1897.
- <sup>141</sup> Blake: Lancet, October 30, 1897.
- <sup>142</sup> Smart: Lancet, November 20, 1897.
- <sup>143</sup> Smyth: Lancet, December 18, 1897.
- <sup>144</sup> Turner: Lancet, February 6, 1897.
- <sup>145</sup> Chapman: Lancet, April 24, 1897.
- <sup>146</sup> Chalmers: Lancet, June 5, 1897.
- <sup>147</sup> Blaker: Lancet, April 10, 1897.
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(TO BE CONCLUDED.)